is also a glossary which, like much of the work, needs revision—*e.g.* "palisade tissue" is defined as the "water-conducting region of plant stems," and "chloroplasts" as "chlorophyll cells." With one of his dicta we heartily agree: "Since ecology and physiology are really complementary, neither can be adequately studied without the other." The volume includes a number of illustrations from photographs, many of which are exceedingly good and very well reproduced.

An Historical Catalogue of Science.

Bibliotheca Chemico-mathematica. Compiled and annotated by H. Z. and H. C. S. Vol. i. Pp. xii + 428 + plates. Vol. ii. Pp. 535 + plates. (London: Henry Sotheran and Co., 1921.) 3*l*. 3*s*. net.

THE mental stimulus to be gained by the study of the historical development of science is of much greater value than is sometimes supposed. He who follows, from the first vague beginnings, the efforts of many workers in various lands, leading at length to some great discovery, whether of practical or of theoretical significance, will be apt to ask himself the question: "Could not I also do something to help forward human knowledge?"

In this sale catalogue of more than 17,000 books on mathematics, astronomy, physics, chemistry, engineering, meteorology, and allied subjects there is ample opportunity for anyone to pick out books relating to his own special department. The search is rendered easy by a subject index.

The volumes comprise two catalogues arranged according to authors' names, together with a supplement, and give the date of publication and present price of each book. The whole work is due to Heinrich Zeitlinger, of Linz, and it is said to contain nearly all the standard works on the subjects catalogued, and most of the earlier works of historical importance.

The most striking features of the catalogue are the fascinating illustrations. They are prepared by a photographic process, and give excellent facsimile representations of title-pages, woodcuts, diagrams, and letterpress taken from more than one hundred books celebrated either for their quaintness or for having announced new discoveries of far-reaching importance. Thus there is a reproduction, on a reduced scale, of Galileo's famous proposition that a body starting from rest under uniform acceleration moves distances proportional to the square of the time. This is photographed from the first edition of his "Discorsi e Dimostrazioni Matematichi," published at Leyden in 1638. Another facsimile is taken from Huygens's "Traité de la Lumière," published in 1690, in which he deduced the equality of the angles of incidence and reflection from the wave theory of light. There are also beautiful reproductions from Kepler's "Dioptrice," published in 1611. The selected pages discuss the refraction of light and the formation of images by convex lenses.

Some pages from "De Beghinselen der Weeghconst," by Simon Stevinus, of Bruges, published in 1586, contain propositions on the inclined plane (triangle of forces), levers, and laws of floating bodies. Among other curious illustrations, we find an early velocipede from a book by Ovenden, dated 1774, and an early railway train, in which stage coaches, complete with driver, guard with coach-horn, and luggage on the roof, are being drawn by a quaint locomotive with a single rope.

Another illustration shows a very early electric telegraph devised in 1816 by Sir Francis Ronalds. The invention was offered to the Admiralty, but Sir Francis was officially answered that, now the French War was over, telegraphs of any kind were totally unnecessary, and that no other method of signalling than the semaphore then in use would be adopted.

From "Mathematicall Magick," by Bishop Wilkins (1648), are given some illustrations of perpetual motion. As it is obvious that the machines could not work, we wonder whether the Bishop, who was the first secretary to the Royal Society, ever tried the experiments!

These few examples will show that the illustrations are mainly selected to show great discoveries in their early stages.

Maps and Map-reading.

(1) *Topographic Maps and Sketch Mapping.* By Prof. J. K. Finch. Pp. xi + 175. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1920.) 13*s*. 6*d*. net.

(2) *Ordnance Survey Maps: Their Meaning and Use. With Descriptions of Typical 1-in. Sheets.* By Dr. Marion I. Newbigin. Second edition. Pp. 128. (Edinburgh: W. and A. K. Johnston, Ltd.; London: Macmillan and Co., Ltd., 1920.) 2*s*. net.

(3) *Notes on Geological Map-reading.* By A. Harker. Pp. 64. (Cambridge: W. Heffer and Sons, Ltd., 1920.) 3*s*. 6*d*. net.

(1) AS the author states in his preface, this book was the outcome of the demand for instruction in map-reading and field sketching

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brought about by the war, and it is one of many owing their appearance to the same cause.

Part i. deals with map-reading, and the surveys of the United States, France, and Britain are represented in the maps used as illustrations; contours and elevations, direction, scale, sections and profiles, slopes, visibility problems, and grids are successively dealt with. Part ii. is concerned with the methods of making sketch-maps and field sketches. The instructions for both the making and interpretation of maps are clear and concise, and there is a useful appendix giving a descriptive list of the principal topographic maps of the world.

(2) Miss Newbigin has produced a very readable and suggestive little volume. Following a general introduction indicating the difficulties which the uninitiated may encounter when confronted with the problem of eliciting desired information from an Ordnance map, and indicating the many and varied uses to which such a map may be put by those properly instructed in its mysteries, the author devotes a chapter to methods of studying the maps with and without extraneous aids, such as photographs. Curiously enough, no mention is made of the possible use of photographs taken from the air in connection with the study of Ordnance maps, though the fact that such photographs are not, as yet, generally available may account for the omission.

The main part of the book is made up of descriptions of selected sheets of the 1-in. survey of Britain, and these are well worked out and of much interest as showing the very varied deductions which may be made from the study of a detailed map.

Much is said of the geological structure of the country, but it is to be feared that, in the absence of geological training on the part of the student, and in too many cases on the part of the teacher also, any geological deductions made merely from a study of the configuration of the ground as depicted in the Ordnance maps will be of but little value, and, if relied upon, may give rise to erroneous impressions. Even in the case of Pleistocene geology the reviewer knows only too well that deductions with regard to details of glacial geology drawn from a study of contours have frequently to be abandoned when the matter is studied in the field; and though such deductions may be useful in the formation of tentative hypotheses by the investigator, they would seem to be somewhat dangerous tools to place in the hands of the novice.

(3) The methods advocated by Mr. Harker, though not new, are developed to an unusual extent, and many applications of great interest are elaborated. He shows that, by the reduction of both the slope of the ground and the dip of the strata to "gradients," it is possible to gain much information with regard to the thickness of beds or formations and the general structure of an area depicted upon a map without the use of the protractor.

The surface gradient is determined in the usual way by measuring the distances between contour lines, and that of the stratum under consideration by determining the strike by joining points of equal altitude on the outcrop, and then drawing parallel strike lines through points where the outcrop crosses successive contour lines. These strike lines will be separated by the same vertical interval as the contour lines, and the stratum-gradient obtained by measuring the distance between contiguous strike lines.

The methods are illustrated by a number of interesting and varied examples on a scale of 6 in. to a mile, and for maps on this scale with numerous contour lines they are readily applicable; but in the case of smaller scales, such as the 1-in. maps most generally in use in this country, much difficulty would attend their use, while in the absence of contour lines they are, of course, inapplicable.

The diagrams are good and clear, but in some of these, and also in parts of the letterpress, lucidity has been to some extent sacrificed to the exigencies of space. Thus in paragraph 23 and the accompanying Fig. 18, in which the reader is for the first time introduced to an "unconformable sequence," the unconformity is complicated by "overlap."

As an aid to teachers or in the hands of senior students or engineers, the methods advocated should prove highly instructive, but the reviewer feels that they do not form an adequate substitute for those more generally in use, and would not be readily grasped by the average junior student.

Our Bookshelf.

Zoology: An Elementary Text-book. By Sir A. E. Shipley and Prof. E. W. MacBride. Fourth edition. (Cambridge Zoological Series.) Pp. xx+752. (Cambridge: At the University Press, 1920.) 20*s*. net.

FIVE years have passed since the third edition of this now well-known text-book appeared, and the authors have taken advantage of the opportunity offered by the call for a new edition to place at their readers' disposal some facts and inferences due to certain recent researches. Thus, in the account of Amœba, Jennings's view that the

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